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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WONG, TINA MEI SENG	
ART UNIT	**PAPER NUMBER**
2874	
NOTIFICATION DATE	**DELIVERY MODE**
09/28/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/560,132	NARA ET AL.	
	Examiner	Art Unit	
	Tina M. Wong	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/9/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted by the International Bureau under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2002/0181857 to Komatsu et al.

In regards to claim 1, Komatsu et al teaches a broadband wavelength multiplexing and demultiplexing filter (Figure 2) comprising:

Mach-Zehnder optical interferometer circuits (8) each having directional couplers (11 & 12) formed on a substrate (1) by a first optical waveguide (3) and a second waveguide (4) provided in parallel to each other with a gap in a lengthwise direction of the optical waveguides therebetween, and a phase part [0072] interposed between the directional couplers;

a first optical interferometer circuit formed by connecting two equal Mach-Zehnder optical interferometer circuits (8A & 8B) in series; and

a light input side circuit formed by connecting one or more first optical interferometer circuits in series;

wherein a light input terminal of a first optical waveguide of the light input side circuit is composed of an input port for optical signals having a plurality of wavelengths, and an output terminal of the first optical waveguide is composed of a through port,

an output terminal of a second optical waveguide of the light input side circuit is composed of a cross port,

a first light output side circuit formed by serially connecting one or more second optical interferometer circuits having the same functional structure as the first optical interferometer circuit is connected to the through port, and

a second light output side circuit including one or more Mach-Zehnder optical interferometer circuits having transmission characteristics different [0138] from those of the Mach- Zehnder optical interferometer circuits constituting the first and the second optical interferometer circuits is connected to the cross port.

But Komatsu et al fails to specifically teach the interferometer circuits to be point symmetrically connected. However, referring to the Figures of Komatsu et al, specifically Figure 2, it can be observed that the interferometer circuits are connected together in series in a point symmetrical type connection. Therefore, although not explicitly stated, Komatsu et al does teach this feature.

In regards to claim 2, since Komatsu et al teaches multi-stage and cascading portion of interferometer circuits, Komatsu et al therefore also teaches the second light output side circuit to have n-stage (where n is an integral number equal to or greater than 2) Mach-Zehnder optical interferometer circuits,

a light output side of a second optical waveguide of a previous-stage Mach-Zehnder optical interferometer circuit is connected to a light input side of a first optical waveguide of the next-stage Mach-Zehnder optical interferometer circuit, that is, a light output side of a second optical waveguide of a first-stage Mach-Zehnder optical interferometer circuit is connected to a light input side of a first optical waveguide of a second-stage Mach-Zehnder optical interferometer circuit,

a light input side of a first optical waveguide of the first-stage Mach-Zehnder optical interferometer circuit is connected to a cross port of the light input side circuit, and

a light input side of a first optical waveguide of the first light output side circuit is connected to a through port of the light input side circuit.

In regards to claim 3, since Komatsu et al teaches multi-stage and cascading portion of interferometer circuits, Komatsu et al therefore also teaches the second light output side circuit has a third point-symmetrically connected optical interferometer circuit having the same functional structure as the first point- symmetrically connected optical interferometer circuit.

In regards to claims 4 and 21, Komatsu et al teaches the optical signals output from the through port among a plurality of wavelengths input to the light input terminal of the first optical waveguide of the light input side circuit are output from the light output side of the first light output side circuit through the first optical waveguide thereof, and

the optical signals output from the cross port of the light input side circuit among the plurality of wavelengths are input to a first optical waveguide of a first-stage circuit of n- stage connection circuits constituting the second light output side circuit and are then output from a light output side of a second optical waveguide of the last-stage circuit.

In regard to claims 5 and 6, since Komatsu et al teaches decreasing transmission loss and crosstalk, Komatsu et al would therefore also teach the optical signal input to one of the first optical waveguide and the second optical waveguide and then output from the one optical waveguide is referred to as a through propagating optical signal, and when the optical signal input to one of the first optical waveguide and the second optical waveguide and then output from the other optical waveguide is referred to as a cross propagating optical signal,

the point-symmetrically connected optical interferometer circuit has one or more low through loss wavelength bands where a loss of the through propagating optical signal is low, and

at least one of the Mach-Zehnder optical interferometer circuits constituting the second light output side circuit is constructed such that a loss of the cross-propagating optical signal has a maximum value in at least one of the low through loss wavelength bands.

In regards to claim 7, Komatsu et al teaches a plurality of the broadband wavelength multiplexing and demultiplexing filters according to claim 1 provided on a substrate in an array shape.

In regards to claim 8, Komatsu et al teaches a Mach-Zehnder optical interferometer circuits each having two directional couplers on a substrate, each directional coupler formed by a first optical waveguide and a second optical waveguide provided in parallel to each other with a gap therebetween, and

a phase-part-intervention-type optical interferometer circuit formed by point-symmetrically arranging two equal Mach-Zehnder optical interferometer circuits in series and connecting them to each other with a phase part for generating a predetermined phase change interposed therebetween,

two equal phase-part-intervention-type optical interferometer circuit being accurately connected in series,

wherein the Mach-Zehnder optical interferometer circuits have equal directional couplers, and these directional couplers are connected in series to each other with a second phase part for generating a phase change different from that in the phase part interposed therebetween.

But Komatsu et al fails to specifically teach the interferometer circuits to be point symmetrically connected. However, referring to the Figures of Komatsu et al, specifically Figure 2, it can be observed that the interferometer circuits are connected together in series in a point symmetrical type connection. Therefore, although not explicitly stated, Komatsu et al does teach this feature.

In regards to claim 9, Komatsu et al teaches a light input terminal of a first optical waveguide of a phase-part- intervention-type point-symmetrically connected optical interferometer circuit is composed of an input port for optical signals having a plurality of wavelengths, and an output terminal of the first optical waveguide is composed of a through port,

an output terminal of a second optical waveguide of the phase-part-intervention-type point-symmetrically connected optical interferometer circuit is composed of a cross port, and

one or more phase-part-intervention-type point-symmetrically connected optical interferometer circuits having the same structure are connected in series to the through port.

In regards to claim 10, Komatsu et al teaches an optical signal input to an input port and then output from the through port passes through only the optical waveguide at the through port side of each phase-part- intervention-type point-symmetrically connected optical interferometer circuit.

In regards to claim 11, Komatsu et al teaches one or more phase-part-intervention-type point-symmetrically connected optical interferometer circuits having the same structure and one or more filter circuits for improving isolation of the optical signal output from the cross port are connected in series to the cross port of the phase-part-intervention-type point-symmetrically connected optical interferometer circuit.

In regards to claim 12, since Komatsu et al teaches multi-stage and cascading portion of interferometer circuits, Komatsu et al therefore also teaches a filter circuit comprising a second directional coupler and a third phase part connected in series to each other,

the second directional coupler is different from the directional coupler of the phase- part-intervention-type point-symmetrically connected optical interferometer circuit in coupling efficiency, and

the third phase part is different from the second phase part in length (phase amount).

In regards to claim 13, Komatsu et al teaches the optical signal input to the input port and then output from the cross port passes through only the optical waveguide at the cross port side of each phase-part- intervention-type point-symmetrically connected optical interferometer circuit.

In regards to claims 14 and 15, Komatsu et al teaches wavelength band where a transmittance of the filter circuit provided at the cross port side is decreased to form a valley-shaped spectrum is equal to a wavelength band where a transmittance of the phase-part-intervention-type point-symmetrically connected optical interferometer circuit provided at the through port is decreased to form a valley-shaped or mountain-shaped spectrum.

In regards to claims 16 and 22, Komatsu et al teaches a plurality of the broadband wavelength multiplexing demultiplexing filters provided on a substrate in an array shape.

In regard to claim 17, Komatsu et al teaches an optical splitter with an optical signal multiplexing and demultiplexing function comprising:

an optical waveguide circuit formed on a substrate, wherein the optical waveguide circuit comprises:

an optical splitter for splitting an optical signal input from a light input port provided at one end of the optical waveguide circuit into a plurality of optical signals having the same intensity and for outputting them from a plurality of light output ports; and

a plurality of optical signal multiplexing and demultiplexing devices arranged in parallel to each other, each being provided with two light input ports and having a function of multiplexing optical signals having different wavelengths input from the light input ports,

wherein one input port of each of the optical signal multiplexing and demultiplexing devices is connected to the corresponding light output port of the optical splitter,

the other light input port of each of the optical signal multiplexing and demultiplexing devices is provided at one end side of the optical waveguide circuit to be parallel to the light input port of the optical splitter, and

a multiplexed optical signal output port of each of the optical signal multiplexing and demultiplexing devices is provided at an end portion side other than a region where the light input port of the optical waveguide circuit is provided.

Although Komatsu et al teaches does not specifically describe the first interferometer as an optical splitter, the interferometer taught by Komatsu et al does teach the splitting of an

optical signal into each of the respective output waveguides. Therefore, Komatsu et al does teach an interferometer capable of performing the functions of an optical splitter.

In regard to claim 18, Komatsu et al teaches a first optical waveguide and a second optical waveguide provided in parallel to the first optical waveguide with a gap therebetween,

wherein two Mach-Zehnder optical interferometer circuits, each having directional couplers formed by arranging the first and the second optical waveguides closely to each other with a gap in a lengthwise direction of the optical waveguides therebetween, are connected in series to each other to form an optical signal multiplexing and demultiplexing device,

an arrangement pitch between the directional couplers in one Mach-Zehnder optical interferometer circuit is equal to that in the other Mach-Zehnder optical interferometer circuit,

a length of a phase part of the first optical waveguide is larger than that of the second optical waveguide by a set length, in the one Mach-Zehnder optical interferometer circuit, and

a length of a phase part of the second optical waveguide is larger than that of the first optical waveguide by the set length, in the other Mach-Zehnder optical interferometer circuit.

In regards to claims 19, 20 and 23, although Komatsu et al does not specifically teach a coupling efficiency of one directional coupler in the Mach-Zehnder optical interferometer circuit is K, a differential coefficient $dK/d\lambda$ of the coupling efficiency K with respect to a wavelength of 1.55 lam is negative, and the coupling efficiency K is about 100% at a wavelength of 1.31 or 1.49 or 1.55 μm, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have specified the claimed wavelength and coupling efficiency values since a center wavelength about 1.31, 1.49 and 1.55 μm are known in the art, as well as maintaining the highest percentage coupling efficiency in order maintain a strong signal.

Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. None of the documents cited by the Examiner discloses or reasonably suggests the allowable subject matter discussed above.

The documents submitted by applicant in the Information Disclosure Statement have been considered and made of record. Note attached copy of form PTO-1449. None of the references submitted by Applicant discloses or reasonably suggest the allowable subject matter discussed above.

Inventorship

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tina M. Wong whose telephone number is (571) 272-2352. The examiner can normally be reached on Monday-Friday 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tina M Wong
Primary Examiner
Art Unit 2874